

**ENGINEERING CHANGE NOTICE**  
**DART AEROSPACE LTD**

Date:	19.07.10	Job No.:	RB18-EXTERNAL LOAD	ADR Yes/No:	N	ADR Date:		ECN #:	19- 814
Product No.:	DART TOOLING EXTERNAL LOAD			Created By:	VM	Approved By:			
Product Name:	C3 CAGE			Checked By:	<i>md</i>				

**Reason for Change:**  
PRODUCTION COMMENTS INCORPORATED  
MANUAL UPDATED PER REV J HARDWARE

**Documents Released:**  
  
C3-C REV J  
O&OPM-C3 REV L

IF APPLICABLE:    NCR: \_\_\_\_\_    PAR: \_\_\_\_\_    CAR: \_\_\_\_\_    CIR: \_\_\_\_\_    URF: \_\_\_\_\_

PAPERWORK UPDATE    ☐    PARTS MUST COMPLY    ☒    PREVIOUS PARTS SATISFACTORY    ☐

#	Quality Assurance / Customer Support Actions	Reqd	Resp	Notes	Complete
1	Notify Previous Customers	N			
2	Notify Airbus	N			
3	Notify Leonardo	N			
4	Manufacturing Licensing Agreement Update	N			

#	Engineering Actions	Reqd	Resp	Notes	Complete
5	Required Documents/Drawings/Item ID's Under Review (URF)	N			
6	Update Master Document List (MDL)	N			
7	Update Document Record (DR)	N			
8	Update Product Compatability Matrix	N			
9	Notify TC / FAA of Change (eg. ICA, 8110-3)	N			
10		N			

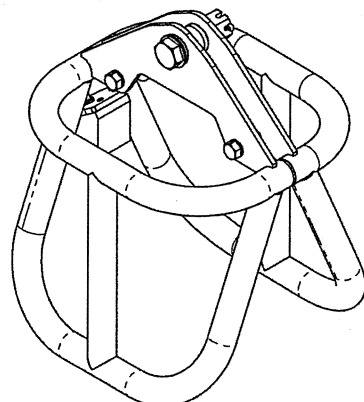
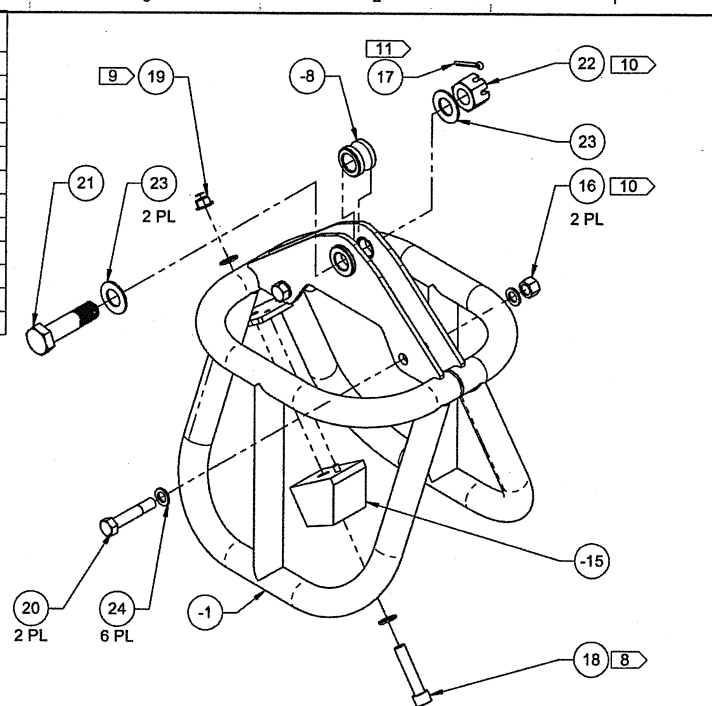
#	Document Control Actions	Reqd	Resp	Notes	Complete
11	Move / Update Electronic Files / Design Journal	Y	MD		<i>md 19.07.15</i>
12	Update Product Specification Files (Bluefiles)	<i>Y</i>	<i>md</i>		<i>md 19.07.12</i>
13	Update Approved/Preliminary Dwg PDF Files	Y	MD		<i>md 19.07.12</i>
14	Update Product Development Summary (STC applications)	N			
15	Update QSI 021 (TC/FAA STC) and/or STC Approval List	N			
16	Create/Update Parts / STC Database	Y	MD		<i>md 19.07.12</i>
17	Update / Verify Authorized Release Certificate Database	<i>Y</i>	<i>md</i>		<i>md 19.07.12</i>
18	Create / Update Change Record Form / Item Card Database	<i>Y</i>	<i>md</i>		
19	Create / Update Packaging Process Plan (PPP)	N			
20	Red Decals required on Packaging Process Plan (PPP)?	N			
21	Update Controlled Supplier Documents (Qpulse) Database	N			
22	Update Grey Project Binder / Electronic Project Folder	N			
23	Update D-Part / M-Drawing / DSI / DEO Master Binders	N			
24	Update "Royalty Paid to" attribute (Parts sold under Dart USA STC's)	N			
25					

**Description / Action:**  
RELEASE O&OPM-C3 REV L MANUAL / PLACE O&OPM-C3 REV **5** IN SUPERCEDED FOLDER  
RELEASE C3-C REV J DRAWING  
PLACE C3-C REV H IN SUPERCEED FOLDER  
COMPONENTS OTHER THAN C3-C-9 & ALL McMaster# HARDWARE CAN BE USED PER REV H  
C3-C-9 & ALL HARDWARE MUST COMPLY PER REV J

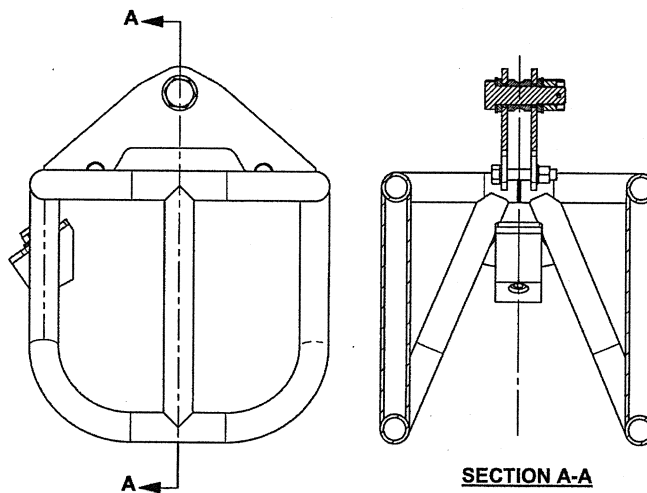
*Done JK*  
*7-15-2019*  
*See Attached.*

ECN Verified & Complete: \_\_\_\_\_ Date: \_\_\_\_\_

ITEM #	QTY	PART #	PART TITLE
-1	1	C3-C-1	WELDMENT C3 CAGE
-8	1	C3-C-8	LIFTING BUSHING
-15	1	C3-C-15	BUMPER ASSY
16	2	MS21044N6	CAD PLATED STEEL HEX LOCKNUT 3/8"-24
17	1	MS24665-355	CAD PLATED STEEL COTTER PIN 1/8" DIA. X 1 1/4" LG.
18	1	NAS1351-6-28	CAD PLATED STEEL SOCKET HEAD CAP SCREW 3/8"-24 X 1.75" LG.
19	1	MS21042-6	CAD PLATED STEEL HEX SELF-LOCKING NUT 3/8"-24
20	2	AN6-17A	CAD PLATE STEEL HEX BOLT 3/8"-24 X 1.953" LG.
21	1	AN10-22	CAD PLATE STEEL HEX HEAD 5/8"-18 X 2.391" LG.
22	1	AN310-10	CAD PLATE STEEL CASTLE NUT 5/8"-18
23	2	NAS1149F1032P	STEEL WASHER 0.640" ID. X 1.188 OD. X 0.065" THK.
24	6	NAS1149F0663P	STEEL WASHER 0.390" ID. X 0.625" OD. X 0.063" THK.



**C3-C C3 CAGE**



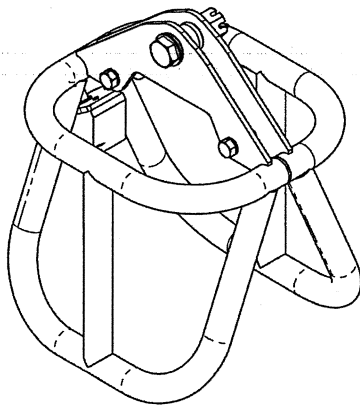
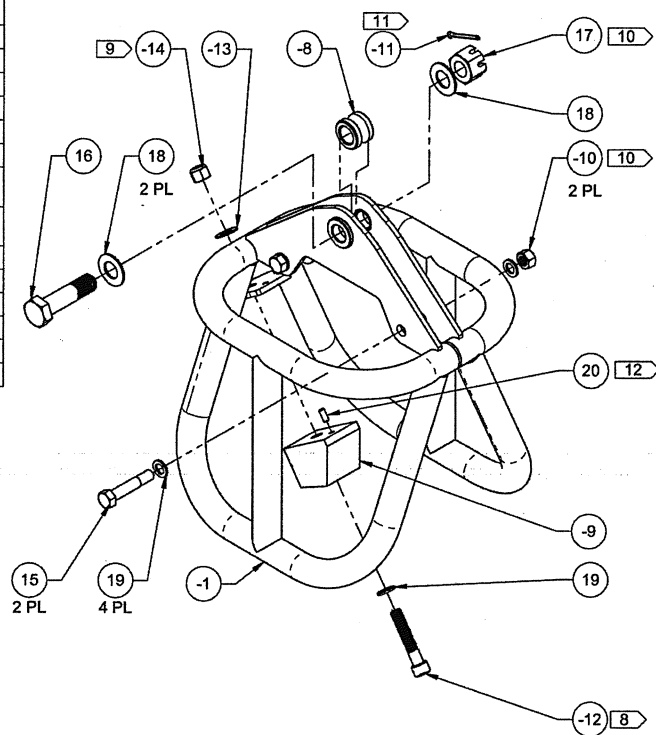
**SECTION A-A**

**NOTES:**

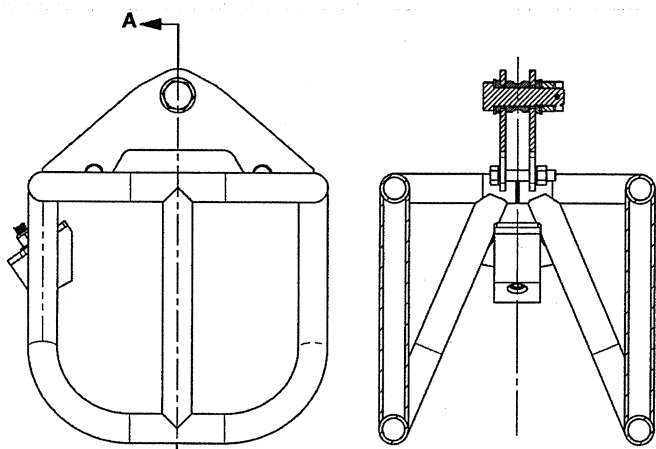
- 1) MATERIAL: N/A
- 2) HEAT TREAT: N/A
- 3) FINISH: N/A
- 4) TOLERANCES: X.X = +/- 0.1" / +/- 1"  
X.XX = +/- 0.01" / +/- 0.5"  
X.XXX = +/- 0.005" / +/- 0.1"  
X.XXXX = +/- 0.0005" / +/- 0.05"  
PARALLELISM, ECCENTRICITY AND SYMMETRY ABOUT ALL CENTER LINES = +/- 0.005"
- 5) UNITS: INCHES UNLESS OTHERWISE NOTED
- 6) IDENTIFICATION: N/A
- 7) ASSEMBLE AS SHOWN
- 8) APPLY RED THREADLOCKER LOCTITE 263/262 ON THREADS OF ITEM -12 THEN ASSEMBLE WITH ITEM -14, AND REMOVE EXCESS
- 9) TORQUE ITEM -14 TO 20-28 FT-LBS
- 10) INSTALL ITEM -10 AND ITEM 17 HAND TIGHT
- 11) DO NOT FOLD COTTER PIN

FOR PREVIOUS REV'S SEE OLD PDFs ITEM -15 ASSY ADDED ITEM -10 McMaster#97135A235 CHANGED FOR ITEM 16 MS21044-N6 ITEM -11 McMaster#90157A112 CHANGED FOR ITEM 17 MS24665-355 ITEM -12 McMaster#92562A358 CHANGED FOR ITEM 18 NAS1351-6-28P ITEM -13 McMaster#98023A031 CHANGED FOR ITEM ITEM 24 NAS1149F0663P ITEM -14 McMaster#97135A230 CHANGED FOR ITEM 19 MS21042-6 ITEM 15 BECOME ITEM 20 ITEM 16 BECOME ITEM 21 ITEM 17 BECOME ITEM 22 ITEM 18 BECOME ITEM 23 ITEM 19 BECOME ITEM 24 ITEM 20 McMaster#98380A504 CHANGED FOR ITEM 25 MS16555-640 ITEM -2 DIMENSION R0.44 2 PL CHANGED FOR R0.50 2 PL ITEM -9 DIMENSION Ø0.1875/0.1867 CHANGED FOR Ø0.1872/0.1867 DIMENSION Ø0.542 CHANGED FOR 0.62, DIMENSION 0.19 CHANGED FOR 0.50		19-814	VM
REV.	DESCRIPTION	ECN #	BY
DESIGN	VM	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA REV. J SHEET 1 OF 11 SCALE NTS COPYRIGHT © 2019 BY DART AEROSPACE LTD <small>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	
DRAWN	VM		
CHECKED	KPT		
MFG. APPR.	JFC		
APPROVED	WY		
TOOL PART # <b>C3-C</b> TITLE <b>C3 CAGE</b> DATE 2019-07-10			

ITEM #	QTY	PART #	PART TITLE
-1	1	C3-C-1	WELDMENT C3 CAGE
-8	1	C3-C-8	LIFTING BUSHING
-9	1	C3-C-9	BUMPER
-10	2	C3-C-10	McMaster#97135A235 OR EQUIV (ZINC YELLOW PLATED GRADE 8 STEEL HEX NUT 3/8"-24)
-11	1	C3-C-11	McMaster#90157A112 OR EQUIV (STEEL CAD PLATED COTTER PIN 1/8" DIA. X 1-1/4" LG.)
-12	1	C3-C-12	McMaster#92562A358 OR EQUIV (CAD PLATED STEEL SOCKET HEAD SCREW 3/8"-16 X 2" LG.)
-13	1	C3-C-13	McMaster#98023A031 OR EQUIV. (YELLOW ZINC PLATED GRADE 8 STEEL WASHER 0.406" ID. X 0.812" OD. X 0.051"-0.080" THK.)
-14	1	C3-C-14	McMaster#97135A230 OR EQUIV. (ZINC YELLOW PLATED GRADE 8 STEEL NYLON INSERT LOCKNUT 3/8"-16)
15	2	AN6-17A	CAD PLATE STEEL HEX BOLT 3/8"-24 X 1.953" LG.
16	1	AN10-22	CAD PLATE STEEL HEX HEAD 5/8"-18 X 2.391" LG.
17	1	AN310-10	CAD PLATE STEEL CASTLE NUT 5/8"-18
18	2	NAS1149F1032P	STEEL WASHER 0.640" ID. X 1.188 OD. X 0.065" THK.
19	5	NAS1149F0663P	STEEL WASHER 0.390" ID. X 0.625" OD. X 0.063" THK.
20	1	McMaster#98380A504 OR EQUIV	SS416 DOWEL PIN 3/16" DIA. X 7/16" LG.



**C3-C C3 CAGE**



**SECTION A-A**

- NOTES:
- 1) MATERIAL: N/A
  - 2) HEAT TREAT: N/A
  - 3) FINISH: N/A
  - 4) TOLERANCES: X.X = +/- 0.1" / +/- 1°  
X.XX = +/- 0.01" / +/- 0.5°  
X.XXX = +/- 0.005" / +/- 0.1°  
X.XXXX = +/- 0.0005" / +/- 0.05°  
PARALLELISM, ECCENTRICITY AND SYMMETRY ABOUT ALL CENTER LINES = +/- 0.005"
  - 5) UNITS: INCHES UNLESS OTHERWISE NOTED
  - 6) IDENTIFICATION: N/A
  - 7) ASSEMBLE AS SHOWN
  - 8) APPLY RED THREADLOCKER LOCTITE 263/262 ON THREADS OF ITEM -12 THEN ASSEMBLE WITH ITEM -14, AND REMOVE EXCESS
  - 9) TORQUE ITEM -14 TO 20-28 FT-LBS
  - 10) INSTALL ITEM -10 AND ITEM 17 HAND TIGHT
  - 11) DO NOT FOLD COTTER PIN
  - 12) APPLY RETAINING COMPOUND LOCTITE 620 OR EQUIVALENT ON MATING SURFACES THEN PRESS FIT ITEM 20 WITH ITEM -9, AND REMOVE EXCESS

H	ITEM -10 McMaster#94191A350 CHANGED FOR McMaster#97135A235 ITEM 19 QTY OF 4X CHANGED FOR 5X ITEM 20 ADDED ITEM -6 DIMENSION $\phi 0.188$ CHANGED FOR $\phi 0.191$ ITEM -9 DIMENSION L $\phi 0.825 \pm 0.419$ CHANGED FOR L $\phi 0.872 \pm 0.542$ , DIMENSION 1.63 ADDED, PIN CHANGED FOR DOWEL PIN HOLE	19-764	VM
G	FOR PREVIOUS REV'S SEE OLD PDFs P/N ATTRIBUTED TO ALL McMaster# TO MATCH THE MANUAL		VM
REV.	DESCRIPTION	ECN #	BY
DESIGN	VM	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA TOOL PART # <b>C3-C</b> TITLE <b>C3 CAGE</b> SCALE 1 OF 10 NTS	
DRAWN	VM		
CHECKED	VM		
MFG. APPR.	DP		
APPROVED	WY		
DATE	2019-06-12	COPYRIGHT © 2019 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

## Jennifer Renwick

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**From:** Jennifer Renwick  
**Sent:** Monday, July 15, 2019 1:02 PM  
**To:** Andrew Tollis; Marcel Daviau  
**Cc:** Vanessa Morel; Linda Lacelle  
**Subject:** FW: ECN 19-814 (C3-C)

Hi Andrew,

Please see stock below that needs to be scrapped per ECN19-814. Vanessa also has one at her desk.

Operation Number	Operation	Container No	Job	Master Unit Number	Quantity	Weight	Serial No/Batch	Location	Container	
Part Number: C3-C-9 Revision: Bumper										
140	QC 21 - SA	<u>S182341</u>	<u>194604</u>		9 pcs	0	S182341	GA192	Bin	
Operation Totals:		1			9	0				
Part Totals:		1			9	0				
Totals:		1			9	0				

Thank you,  
Jen

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**From:** Linda Lacelle <llacelle@dartaero.com>  
**Sent:** Monday, July 15, 2019 11:57 AM  
**To:** Vanessa Morel <vmorel@dartaero.com>; Jennifer Renwick <jrenwick@dartaero.com>  
**Cc:** Michael Lee <mlee1@dartaero.com>  
**Subject:** RE: ECN 19-814 (C3-C)

Anything that needs to be scrapped needs to go to quality

## Jennifer Renwick

**From:** Vanessa Morel  
**Sent:** Monday, July 15, 2019 11:00 AM  
**To:** Jennifer Renwick  
**Cc:** Michael Lee; Linda Lacelle  
**Subject:** RE: ECN 19-814 (C3-C)

Hi Jen,

Everything below is right

**Vanessa Morel**  
*Mechanical Designer*

**DART AEROSPACE**  
T 1 613 632-5200 Ext.302  
E [vmorel@dartaero.com](mailto:vmorel@dartaero.com)  
W [www.dartaerospace.com](http://www.dartaerospace.com)



---

**From:** Jennifer Renwick  
**Sent:** July 15, 2019 10:50 AM  
**To:** Vanessa Morel <[vmorel@dartaero.com](mailto:vmorel@dartaero.com)>  
**Cc:** Michael Lee <[mlee1@dartaero.com](mailto:mlee1@dartaero.com)>; Linda Lacelle <[llacelle@dartaero.com](mailto:llacelle@dartaero.com)>  
**Subject:** RE: ECN 19-814 (C3-C)

Hi Vanessa,

Yes, I understand that the new hardware per below should be used as per Rev J.. but I need to make sure we change the existing old stock correctly.

OLD PART	NEW PART
MS21044N6	CAD PLATED STEEL HEX LOCKNUT 3/8"-24
MS24665-355	CAD PLATED STEEL COTTER PIN 1/8" DIA. X 1 1/4" LG.
NAS1351-6-28	CAD PLATED STEEL SOCKET HEAD CAP SCREW 3/8"-24 X 1.75" LG.
MS21042-6	CAD PLATED STEEL HEX SELF-LOCKING NUT 3/8"-24
AN6-17A	CAD PLATE STEEL HEX BOLT 3/8"-24 X 1.953" LG.
AN10-22	CAD PLATE STEEL HEX HEAD 5/8"-18 X 2.391" LG.
AN310-10	CAD PLATE STEEL CASTLE NUT 5/8"-18
NAS1149F1032P	STEEL WASHER 0.640" ID. X 1.188 OD. X 0.065" THK.
NAS1149F0663P	STEEL WASHER 0.390" ID. X 0.625" OD. X 0.063" THK.

Can you please confirm if the below is correct?

I believe we have to do the following:

- 1- Scrap all C3-C-9 bumpers / we will make new C3-C-15 bumpers - *Asked Andrew*
- 2- The below hardware can be used for stock.. but part# should be changed to McMaster Carr part#

C3-C-10 McMaster#97135A235 OR EQUIV (ZINC YELLOW PLATED GRADE 8 STEEL HEX NUT 3/8"-24)

C3-C-11 McMaster#90157A112 OR EQUIV (STEEL CAD PLATED COTTER PIN 1/8" DIA. X 1-1/4" LG.)

*NO STK*  
*NO STK*

C3-C-12 McMaster#92562A358 OR EQUIV (CAD PLATED STEEL SOCKET HEAD SCREW 3/8"-16 X 2" LG.) *No Stk*  
C3-C-13 McMaster#98023A031 OR EQUIV. (YELLQW ZINC PLATED GRADE 8 STEEL WASHER 0.406" ID. X 0.812" OD. X 0.051 "-0.080" THK.) *No Stk*  
C3-C-14 McMaster#97135A230 OR EQUIV. (ZINC YELLOW PLATED GRADE 8 STEEL NYLON INSERT LOCKNUT 3/8"-16) *No Stk*  
McMaster#98380A504 OR EQUIV SS416 DOWEL PIN 3/16" DIA. X 7/16" LG. *No Stk*

3- All other stock hardware can be left as is. No changes from Rev H to J

AN6-17A CAD PLATE STEEL HEX BOLT 3/8"-24 X 1.953" LG.  
AN 10-22 CAD PLATE STEEL HEX HEAD 5/8"-18 X 2.391" LG.  
AN310-10 CAD PLATE STEEL CASTLE NUT 5/8"-18  
NAS1149F1032P STEEL WASHER 0.640" ID. X 1.188 OD. X 0.065" THK.  
NAS1149F0663P STEEL WASHER 0.390" ID. X 0.625" OD. X 0.063" THK.

Thank you,  
Jen

**From:** Vanessa Morel <[vmorel@dartaero.com](mailto:vmorel@dartaero.com)>  
**Sent:** Monday, July 15, 2019 10:43 AM  
**To:** Jennifer Renwick <[jrenwick@dartaero.com](mailto:jrenwick@dartaero.com)>  
**Cc:** Michael Lee <[mlee1@dartaero.com](mailto:mlee1@dartaero.com)>; Linda Lacelle <[llacelle@dartaero.com](mailto:llacelle@dartaero.com)>  
**Subject:** RE: ECN 19-814 (C3-C)

Hi Jen,

No the hardware need to be changed with aerospace hardware PER REV J  
Components **OTHER** than C3-C-9 & old hardware can be use as is.

**Vanessa Morel**  
*Mechanical Designer*

**DART AEROSPACE**  
T 1 613 632-5200 Ext.302  
E [vmorel@dartaero.com](mailto:vmorel@dartaero.com)  
W [www.dartaerospace.com](http://www.dartaerospace.com)



**From:** Jennifer Renwick  
**Sent:** July 15, 2019 10:40 AM  
**To:** Vanessa Morel <[vmorel@dartaero.com](mailto:vmorel@dartaero.com)>  
**Cc:** Michael Lee <[mlee1@dartaero.com](mailto:mlee1@dartaero.com)>; Linda Lacelle <[llacelle@dartaero.com](mailto:llacelle@dartaero.com)>  
**Subject:** FW: ECN 19-814 (C3-C)

Hi Vanessa,

Can you please confirm if we can re-use the hardware? The below statements contradict each other?

**COMPONENTS OTHER THAN C3-C-9 & ALL McMaster# HARDWARE CAN BE USED**  
**C3-C-9 & ALL HARDWARE MUST COMPLY PER REV J**

I believe we have to do the following:

- 1- Scrap all C3-C-9 bumpers / we will make new C3-C-15 bumpers
- 2- The below hardware can be used but stock part# should be changed to McMaster Carr part#

C3-C-10 McMaster#97135A235 OR EQUIV (ZINC YELLOW PLATED GRADE 8 STEEL HEX NUT 3/8"-24)  
C3-C-11 McMaster#90157A112 OR EQUIV (STEEL CAD PLATED COTTER PIN 1/8" DIA. X 1-1/4" LG.)  
C3-C-12 McMaster#92562A358 OR EQUIV (CAD PLATED STEEL SOCKET HEAD SCREW 3/8"-16 X 2" LG.)  
C3-C-13 McMaster#98023A031 OR EQUIV. (YELLOW ZINC PLATED GRADE 8 STEEL WASHER 0.406" ID. X 0.812" OD. X 0.051 "-0.080" THK.)  
C3-C-14 McMaster#97135A230 OR EQUIV. (ZINC YELLOW PLATED GRADE 8 STEEL NYLON INSERT LOCKNUT 3/8"-16)  
McMaster#98380A504 OR EQUIV SS416 DOWEL PIN 3/16" DIA. X 7/16" LG.

- 3- All other hardware on drawing can be left as is. No changes from Rev H to J

AN6-17A CAD PLATE STEEL HEX BOLT 3/8"-24 X 1.953" LG.  
AN 10-22 CAD PLATE STEEL HEX HEAD 5/8"-18 X 2.391" LG.  
AN310-10 CAD PLATE STEEL CASTLE NUT 5/8"-18  
NAS1149F1032P STEEL WASHER 0.640" ID. X 1.188 OD. X 0.065" THK.  
NAS1149F0663P STEEL WASHER 0.390" ID. X 0.625" OD. X 0.063" THK.

Thank you,  
Jen

**From:** Michelle GagnonDonovan <[mgagnondonovan@dartaero.com](mailto:mgagnondonovan@dartaero.com)>

**Sent:** Monday, July 15, 2019 7:59 AM

**To:** Daniel Paquette <[dpaquette@dartaero.com](mailto:dpaquette@dartaero.com)>; David Duval <[dduval@dartaero.com](mailto:dduval@dartaero.com)>; Holly Zhao <[hzhao@dartaero.com](mailto:hzhao@dartaero.com)>; Jean Francois Sauve <[jfsauve@dartaero.com](mailto:jfsauve@dartaero.com)>; Jean-Luc Menard <[jmenard@dartaero.com](mailto:jmenard@dartaero.com)>; Jennifer Renwick <[jrenwick@dartaero.com](mailto:jrenwick@dartaero.com)>; John Chuprun <[jchuprun@dartaero.com](mailto:jchuprun@dartaero.com)>; Konrad Sauve <[ksauve@dartaero.com](mailto:ksauve@dartaero.com)>; Linda Lacelle <[llacelle@dartaero.com](mailto:llacelle@dartaero.com)>; Lisa McMachen <[lmcmachen@dartaero.com](mailto:lmcmachen@dartaero.com)>; Marc Bellavance <[mbellavance@dartaero.com](mailto:mbellavance@dartaero.com)>; Marcel Daviau <[mdaviau@dartaero.com](mailto:mdaviau@dartaero.com)>; Marie Lajeunesse <[mlajeunesse@dartaero.com](mailto:mlajeunesse@dartaero.com)>; Patrick Duval <[pduval@dartaero.com](mailto:pduval@dartaero.com)>; Rachel Maloney <[rmaloney@dartaero.com](mailto:rmaloney@dartaero.com)>; Robert Aboud <[raboud@dartaero.com](mailto:raboud@dartaero.com)>; Ross Black <[rblack@dartaero.com](mailto:rblack@dartaero.com)>; Sian Willems <[swillems@dartaero.com](mailto:swillems@dartaero.com)>; Steven Drouin <[sdrouin@dartaero.com](mailto:sdrouin@dartaero.com)>; Steven Hemmerich <[shemmerich@dartaero.com](mailto:shemmerich@dartaero.com)>; Support <[support@dartaero.com](mailto:support@dartaero.com)>; Virginie Legault <[vlegault@dartaero.com](mailto:vlegault@dartaero.com)>

**Subject:** ECN 19-814 (C3-C)

Hello,

Please find a copy of ECN 19-814 attached.

Thank you,

**Michelle Gagnon-Donovan**  
Document Controller

**DART AEROSPACE**  
T 1 613 632-5300 > 251

[www.dartaerospace.com](http://www.dartaerospace.com)

